

U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER
FORM PTO-1390 (REV 5-93)		225/48715
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		U S APPLICATION NO (if known, see 37 CFR 1.5) 09/806465
INTERNATIONAL APPLICATION NO. PCT/EP99/07267	INTERNATIONAL FILING DATE OCTOBER 1, 1999	PRIORITY DATE CLAIMED OCTOBER 2, 1998
TITLE OF INVENTION METHOD FOR DESULFURIZING ENGINE FUEL ON BOARD A MOTOR VEHICLE		
APPLICANT(S) FOR DO/EO/US Eberhard HOLDER, Roland KEMMER, Martin MATT, Viktor PFEFFER, Carsten PLOG, Thomas STENGEL, Ralph STETTER and Karl-Heinz THIEMANN		
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:		
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371</p> <p>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1)).</p> <p>4. <input type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <ul style="list-style-type: none"> a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US) <p>6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <ul style="list-style-type: none"> a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input type="checkbox"/> have not been made and will not be made. <p>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). UNEXECUTED</p> <p>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p>		
Item 11. to 16. below concern other document(s) or information included:		
<p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment.</p> <p><input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>14. <input type="checkbox"/> A substitute specification.</p> <p>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>16. <input checked="" type="checkbox"/> Other items or information:</p>		
PCT/IB/308		



23911

PATENT TRADEMARK OFFICE

U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 09/806465	INTERNATIONAL APPLICATION NO PCT/EP99/07267	ATTORNEY'S DOCKET NUMBER 225/49816																
17. [X] The following fees are submitted: Basic National Fee (37 CFR 1.492(a)(1)-(5)):		CALCULATIONS PTO USE ONLY																
Search Report has been prepared by the EPO or JPO \$860.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) \$690.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482)																		
but international search fee paid to USPTO (37 CFR 1.445(a)(2) \$710.00 Neither international preliminary examination fee (37 CFR 1.482) nor																		
international search fee (37CFR 1.445(a)(2) paid to USPTO \$ 1000.00 International preliminary examination fee paid to USPTO (37 CFR 1.482)																		
and all claims satisfied provisions of PCT Article 33(2)-(4) \$100.00																		
ENTER APPROPRIATE BASIC FEE AMOUNT = \$ 860.00																		
Surcharge of \$130.00 for furnishing the oath or declaration later than [] 20 [X] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).		\$ 130.00																
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Claims</th> <th style="text-align: left;">Number Filed</th> <th style="text-align: left;">Number Extra</th> <th style="text-align: left;">Rate</th> </tr> </thead> <tbody> <tr> <td>Total Claims</td> <td>- 20 =</td> <td></td> <td>X \$18.00</td> </tr> <tr> <td>Independent Claims</td> <td>- 3 =</td> <td></td> <td>X \$80.00</td> </tr> <tr> <td>Multiple dependent claims(s) (if applicable)</td> <td></td> <td></td> <td>+ \$270.00</td> </tr> </tbody> </table>		Claims	Number Filed	Number Extra	Rate	Total Claims	- 20 =		X \$18.00	Independent Claims	- 3 =		X \$80.00	Multiple dependent claims(s) (if applicable)			+ \$270.00	
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TOTAL OF ABOVE CALCULATIONS = \$ 990.00																		
Applicant claims Small Entity Status (See 37 CFR §1.27) [] yes [] no.		\$																
Reduction by 1/2 for filing by small entity, if applicable.																		
SUBTOTAL = \$ 990.00																		
Processing fee of \$130.00 for furnishing the English translation later than [] 20 [] 30 months from the earliest claimed priority date (37 CFR 1.492(f)).		\$																
TOTAL NATIONAL FEE = \$ 990.00																		
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28,3.31). \$40.00 per property +		\$																
TOTAL FEE ENCLOSED = \$ 990.00																		
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		charged \$																
<p>a. [X] One check in the amount of <u>\$ 990.00</u> for the filing fee is enclosed</p> <p>b. [] Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. [X] The Commissioner is hereby authorized to charge any additional fees, which may be required, or credit any overpayment to Deposit Account No. <u>05-1323</u>. A duplicate copy of this sheet is enclosed.</p>																		
<p>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</p>																		
<p>SEND ALL CORRESPONDENCE TO: Evenson, McKeown, Edwards & Lenahan, P.L.L.C. 1200 G Street, N.W., Suite 700 Washington, D.C. 20005 Tel. No. (202) 628-8800 Fax No. (202) 628-8844</p>																		
<p><i>fu</i></p> <p><i>Ward D. Evenson /39085</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">SIGNATURE</td> </tr> <tr> <td style="text-align: center;">Donald D. Evenson</td> </tr> <tr> <td style="text-align: center;">NAME</td> </tr> <tr> <td style="text-align: center;">26,160</td> </tr> <tr> <td style="text-align: center;">REGISTRATION NUMBER</td> </tr> <tr> <td style="text-align: center;">April 2, 2001</td> </tr> <tr> <td style="text-align: center;">DATE</td> </tr> </table>			SIGNATURE	Donald D. Evenson	NAME	26,160	REGISTRATION NUMBER	April 2, 2001	DATE									
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DATE																		

09/806465
532 Rec'd 02 APR 2001 02 APR 2001

Attorney Docket: 225/49816
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: EBERHARD HOLDER ET AL.

Serial No.: NOT YET ASSIGNED Group Art Unit:

PCT APPLICATION NO. PCT/EP99/07267

Filed: April 2, 2001 Examiner:

Title: METHOD FOR DESULPHURIZING ENGINE FUEL ON BOARD
A MOTOR VEHICLE

PRELIMINARY AMENDMENT

Box PCT
Commissioner for Patents
Washington, D.C. 20231

Sir:

Please enter the following amendments to the specification and claims, as amended by way of Annexes to the International Preliminary Examination Report for PCT/EP99/07267, prior to the examination of the application during the U.S. National Phase.

IN THE SPECIFICATION:

Page 1, lines 6-9:

BACKGROUND AND SUMMARY OF INVENTION

The invention relates to a process for the desulfurization of an engine fuel onboard a motor vehicle.

Page 1, lines 28-30:

This object is achieved by the process according to the present invention. Advantageous embodiments of the invention form the subject matter of further claims.

Page 4, lines 1-16:

The invention is explained in more detail with reference to drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a first structure for carrying out the process according to the invention;

Fig. 2 shows a second structure for carrying out the process according to the invention;

Fig. 3 shows an adsorption device for carrying out the process according to the invention;

Fig. 4 shows a test structure for determining the adsorber properties and adsorber capacity;

Fig. 5 shows the effect of the fuel sulfur content on the NO_x conversion of an exhaust-gas after-treatment system.

DETAILED DESCRIPTION OF THE DRAWINGS

The adsorption device may be connected in series downstream of the fuel pump (Fig. 1) or as a bypass to the normal fuel supply (Fig. 2).

Page 7, line 4:

WHAT IS CLAIMED IS:

IN THE CLAIMS:

Please cancel all of the claims presently in the application and substitute new Claims 13-29 as follows:

13. (New) A process for the desulfurization of an engine fuel onboard a motor vehicle, comprising:

contacting an engine fuel comprising sulfur-containing components with a selective liquid-phase adsorption material comprising an oxide of Al, Mg, Si, or Ti that is doped with Ag; and

separating the sulfur-containing components from the engine fuel, thereby obtaining a low-sulfur fuel.

14. (New) A process according to Claim 13, wherein the adsorption material has an internal surface area of from 10 to 1600 m²/g.

15. (New) A process according to Claim 13, wherein the adsorption material comprises at least one of Al₂O₃, MgO, SiO₂, or TiO₂.

16. (New) A process according to Claim 13, wherein the adsorption material comprises zeolites, hydrotalcites, or mixed oxides doped with Ag.

17. (New) A process according to Claim 13, wherein the adsorption material is a biogenic material.

18. (New) A process according to Claim 13, wherein the biogenic material comprises an enzyme or a microorganism.

19. (New) A process according to Claim 13, wherein the engine fuel is selected from the group consisting of petrol, diesel fuel, kerosine, and methanol.

20. (New) A process according to Claim 13, further comprising collecting the low-sulphur fuel in a tank.

21. (New) A process according to Claim 13, further comprising immediately using the low-sulfur fuel.

22. (New) A process according to Claim 13, wherein the adsorption material is arranged in series with a fuel pump.

23. (New) A process according to Claim 13, wherein the adsorption material is arranged in a bypass circuit of a fuel pump.

24. (New) A process according to Claim 13, wherein the adsorption material is integrated in a single structural unit with a fuel filter.

25. (New) A process according to Claim 13, further comprising regenerating a sulfur-containing adsorption material onboard the motor vehicle.

26. (New) A process according to Claim 13, further comprising replacing a sulfur-containing adsorption material.

27. (New) A process according to Claim 25, wherein the regenerating comprises heating the sulfur-containing adsorption material with the engine oil or the engine coolant of the motor vehicle.

28. (New) A process for removing nitrogen oxides from a lean exhaust gas, comprising:

contacting the low-sulfur fuel according to Claim 13 with a catalytic converter; and

removing nitrogen oxides from the lean exhaust gas by using the low-sulfur fuel as a reducing agent.

29. (New) A process for desulfurizing a catalytic converter in an exhaust-gas after-treatment engine system, comprising regenerating the catalytic converter with low-sulfur fuel obtained according to Claim 13, thereby desorbing accumulated sulfur from the catalytic converter.

IN THE ABSTRACT:

Please delete the Abstract and substitute the attached Abstract.

REMARKS

Claims 13-29 are pending herein. Entry of the amendments to the specification and claims, as amended by way of Annexes to the International Preliminary Examination Report for PCT/EP99/07267, before examination of the application in the U.S. National Phase is respectfully requested.

If there are any questions regarding this Preliminary Amendment or this application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #225/49816).

April 2, 2001

Respectfully submitted,



Warren A. Zitlau
Registration No. 39,085

Donald D. Evenson
Registration No. 26,160

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ABSTRACT OF THE DISCLOSURE

A process for the desulfurization of an engine fuel onboard a motor vehicle includes separating sulfur-containing components of the engine fuel by selective liquid-phase adsorption on an adsorption material. The adsorption material may be an oxide of Al, Mg, Si, or Ti that is doped with Ag.

ATTACHMENT SHOWING MARKED UP CHANGES TO SPECIFICATION

Page 1, lines 6-9:

BACKGROUND AND SUMMARY OF INVENTION

The invention relates to a process for the desulfurization of an engine fuel onboard a motor vehicle.

Page 1, lines 28-30:

This object is achieved by the process according to [Claim 1] the present invention. Advantageous embodiments of the invention form the subject matter of further claims.

Page 4, lines 1-16:

The invention is explained in more detail with reference to drawings[, in which:].

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a first structure for carrying out the process according to the invention;

Fig. 2 shows a second structure for carrying out the process according to the invention;

Fig. 3 shows an adsorption device for carrying out the process according to the invention;

Fig. 4 shows a test structure for determining the adsorber properties and adsorber capacity;

Fig. 5 shows the effect of the fuel sulfur content on the NO_x conversion of an exhaust-gas after-treatment system.

DETAILED DESCRIPTION OF THE DRAWINGS

The adsorption device may be connected in series downstream of the fuel pump (Fig. 1) or as a bypass to the normal fuel supply (Fig. 2).

Page 7, line 4:

[Patent claims] WHAT IS CLAIMED IS:

29301/WO/1

DaimlerChrysler AG
Stuttgart

Process for the desulphurization of an engine fuel
5 onboard a motor vehicle

The invention relates to a process for the desulphurization of an engine fuel onboard a motor vehicle.

10 The desulphurization of engine fuel is usually carried out using large-scale chemical processes in refineries during production of the fuel. Processes which are known for this purpose include extraction, adsorption (e.g. US 5,360,536), distillation or microbiological 15 processes. Commercially available engine fuels in Europe currently have a residual sulphur content of approximately 200 ppm. This causes problems with regard to the sulphur compatibility of modern exhaust-gas after-treatment systems, which include adsorbers and catalytic 20 converters. Therefore, residual sulphur contents of less than 10 ppm are desired.

It is an object of the invention to provide a process for separating off sulphur-containing components from an engine fuel which is suitable for use in mobile 25 systems. In particular, only a small overall volume and a low weight should be required in order to implement this process.

This object is achieved by the process according to Claim 1. Advantageous embodiments of the invention 30 form the subject matter of further claims.

According to the invention, the desulphurization of the fuel takes place onboard the motor vehicle by selectively separating off the sulphur-containing fuel components by means of liquid-phase adsorption. To do 35 this, an adsorption material which selectively adsorbs

substantially only the sulphur-containing fuel components is used.

The adsorption means used is in particular solids with a high surface area (in particular in the range from 5 10 to 1 600 m²/g), primarily substances of this type which contain Al, Mg, Si or Ti in oxide form. Examples of these substances are Al₂O₃, MgO, SiO₂, TiO₂, zeolites, hydrotalcites or mixed oxides. It is also possible to use the said substances doped with a metal, such as for 10 example an alkali metal, an alkaline-earth metal, a rare earth, or Ag, Cu, Co, Fe, Mn, Ni, V or Zn. Biogenic materials, such as for example enzymes, can also be used. Furthermore, it is possible to convert the sulphur contained in the fuel into other sulphur compounds by 15 means of microorganisms which are brought into contact with the fuel.

The adsorption material has a temporally limited separating capacity and has to be replaced after a period of time as part of the regular servicing of the vehicle. 20 In an alternative embodiment, however, the adsorption material can also be regenerated onboard the motor vehicle, in particular by heat treatment. The regeneration can advantageously be carried out by temperature control by means of the coolant circuit (approx. 80 °C) or engine oil circuit (> 100 °C) which is 25 present in the vehicle.

In an advantageous embodiment, adsorption device and fuel filter can be integrated in a single structural unit. In this case, adsorption material and the material 30 for the fuel filtering may, for example, be arranged or layered immediately next to or on top of one another.

By using the low-sulphur fuel obtained, it is possible to significantly prolong the service life of modern exhaust-gas after-treatment systems.

The low-sulphur fuel is particularly suitable for being added when a spark-ignition engine is operating in lean-burn mode.

5 In the case of a diesel engine, the particle emissions in the exhaust gas can be reduced by the addition of low-sulphur diesel fuel.

In addition to being used as an engine fuel, the low-sulphur fuel can also be used as a reducing agent for deNOx catalytic converters in lean exhaust gas.

10 A further application for the low-sulphur fuel obtained using the process according to the invention is its use in the desulphurization of a catalytic converter in an exhaust-gas after-treatment system of an engine. In the exhaust-gas after-treatment system, from time to time 15 sulphur accumulates on the surface of the catalytic converter and is removed by regeneration (desorption). This can only take place with low-sulphur exhaust gas.

20 The outlay on equipment for carrying out the process according to the invention is low. Consequently, it is also possible for the overall volume and weight to be kept low. The process according to the invention is therefore suitable for use in all mobile systems, such as passenger or commercial vehicles or in rail-borne vehicles.

25 A further advantage of the process according to the invention is that the low-sulphur fuel fraction is available onboard as soon as the engine is started. It is therefore possible to dispense with an additional storage tank for low-sulphur fuel specifically for the cold-start 30 phase.

The low-sulphur fuel obtained can either be utilized immediately or can be stored in a tank.

35 The process according to the invention can be used for all engine fuels, in particular petrol or diesel fuels, kerosine or methanol.

The invention is explained in more detail with reference to drawings, in which:

Fig. 1 shows a first structure for carrying out the process according to the invention;

5 Fig. 2 shows a second structure for carrying out the process according to the invention;

Fig. 3 shows an adsorption device for carrying out the process according to the invention;

10 Fig. 4 shows a test structure for determining the adsorber properties and adsorber capacity;

Fig. 5 shows the effect of the fuel sulphur content on the NO_x conversion of an exhaust-gas after-treatment system.

15 The adsorption device may be connected in series downstream of the fuel pump (Fig. 1) or as a bypass to the normal fuel supply (Fig. 2).

20 Fig. 1 shows an arrangement with the fuel pump and adsorption device arranged in series. The fuel is removed from the fuel tank KT by means of electrical fuel pump KP and then passes through the adsorption device AD according to the invention before being fed to the engine via the injection nozzle ED. The intake pipe of the engine is denoted by AR. In the series circuit illustrated here, all the fuel supplied to the engine is 25 desulphurized.

30 In the case of the bypass circuit, it is possible to switch between the normal branch, without the adsorption device, and the branch with the adsorption device, by means of a valve V. In this way, it is possible to employ the desulphurization only in certain operating phases of the engine. For example, the desulphurization can be included in a controlled manner only when the engine is in lean-burn mode and during desulphurization of the adsorber catalytic converter 35 contained in the exhaust-gas after-treatment system. The bypass circuit illustrated allows the running capacity of

the adsorption device to be increased or allows the adsorption device to be of smaller design.

Fig. 3 diagrammatically depicts an adsorption device in the form of a separating column, the interior 5 of which is filled by the adsorption material. The sulphur-containing fuel mixture to be separated is introduced undiluted into the inlet of the separating column and is passed to the adsorption material. The sulphur-containing fuel components are selectively 10 adsorbed on the adsorption material. The sulphur-free (generally low-boiling) fuel components which have not been adsorbed leave the separation column at the opposite end as the eluate. The separation column is surrounded by an annular channel through which a heat-transfer medium 15 flows in order to control the temperature of the separation column.

Fig. 4 shows the test structure for determining the adsorber properties and the adsorber capacity. The fuel is removed from a storage vessel and is passed 20 through the temperature-controlled adsorption column by means of a HPLC pump (max. throughput 10 ml/min). For quantitative analysis, the eluate can be analysed off-line by means of gas chromatography and X-ray fluorescence analysis.

Fig. 5 shows the effect of the sulphur content of 25 the fuel on the NO_x conversion of an exhaust-gas after-treatment system. The operating duration (in hours) is plotted on the abscissa, and the NO_x conversion (in %) is plotted on the ordinate. Two series of measurements were 30 recorded for sulphur contents of 31 ppm and 130 ppm, with the same type of catalytic converter. The tests were carried out using a direct-injection spark-ignition engine in mixed lean-burn mode (30 seconds of lean-burn mode with $\lambda = 1.5$ and 2 seconds of rich-burn mode with 35 $\lambda = 0.75$). As can be seen from the comparison of the

measurement series, the service life of the catalytic converter falls drastically with a high sulphur content.

DaimlerChrysler AG
Stuttgart

Patent claims:

5

1. Process for the desulphurization of an engine fuel onboard a motor vehicle by separating off the sulphur-containing components of the engine fuel by means of selective liquid-phase adsorption on an adsorption material.

10

2. Process according to Claim 1 or 2, characterized in that the adsorption material has an internal surface area of from 10 to 1 600 m²/g.

15

3. Process according to one of the preceding claims, characterized in that the adsorption material contains Al, Mg, Si or Ti in oxide form, such as for example Al₂O₃, MgO, SiO₂, TiO₂, zeolites, hydrotalcites, mixed oxides or the said substances doped with a metal, such as for example alkali metals, alkaline-earth metals, rare earths, Ag, Cu, Co, Fe, Mn, Ni, V, Zn.

20

4. Process according to one of Claims 1 or 2, characterized in that the adsorption material is a biogenic material, such as for example an enzyme, or contains microorganisms.

25

5. Process according to one of the preceding claims, characterized in that the fuel is a petrol or diesel fuel or kerosine or methanol.

30

6. Process according to one of the preceding claims, characterized in that the low-sulphur fuel obtained is used immediately or is collected in a tank.

7.

Process according to one of the preceding claims, characterized in that the low-sulphur fuel obtained is used as reducing agent for deNO_x catalytic converters in lean exhaust gas.

35

8. Process according to one of the preceding claims, characterized in that the adsorption material is arranged

in series with the fuel pump or as bypass circuit with respect to the fuel pump.

9. Process according to Claim 8, characterized in that the low-sulphur fuel obtained in the bypass circuit
5 is used when the engine is in lean-burn mode or during desulphurization of the exhaust-gas after-treatment system of the engine.

10. Process according to one of the preceding claims, characterized in that the adsorption material is
10 integrated in a single structural unit with the material for the fuel filtering.

11. Process according to one of the preceding claims, characterized in that the laden adsorption material is regenerated onboard the motor vehicle or is replaced.

15 12. Process according to Claim 11, characterized in that the engine oil or the engine coolant of the motor vehicle is used as heat source for the regeneration of the adsorption material.

29301/WO/1

DaimlerChrysler AG
Stuttgart

Abstract

The invention relates to a process for the desulphurization of an engine fuel onboard a motor vehicle by separating off the sulphur-containing components of the engine fuel by means of selective liquid-phase adsorption on an adsorption material.

DaimlerChrysler AG Stuttgart

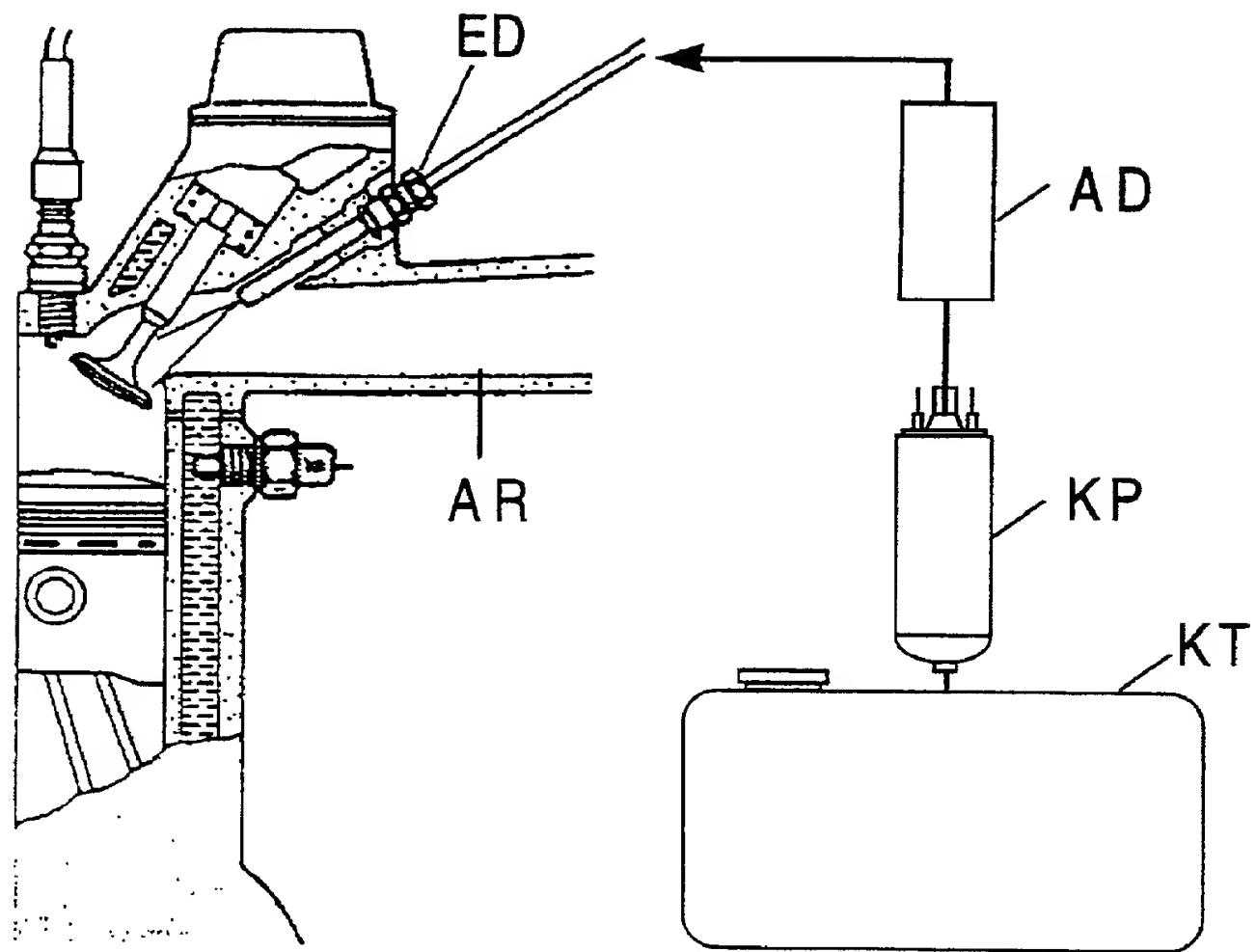


Fig. 1

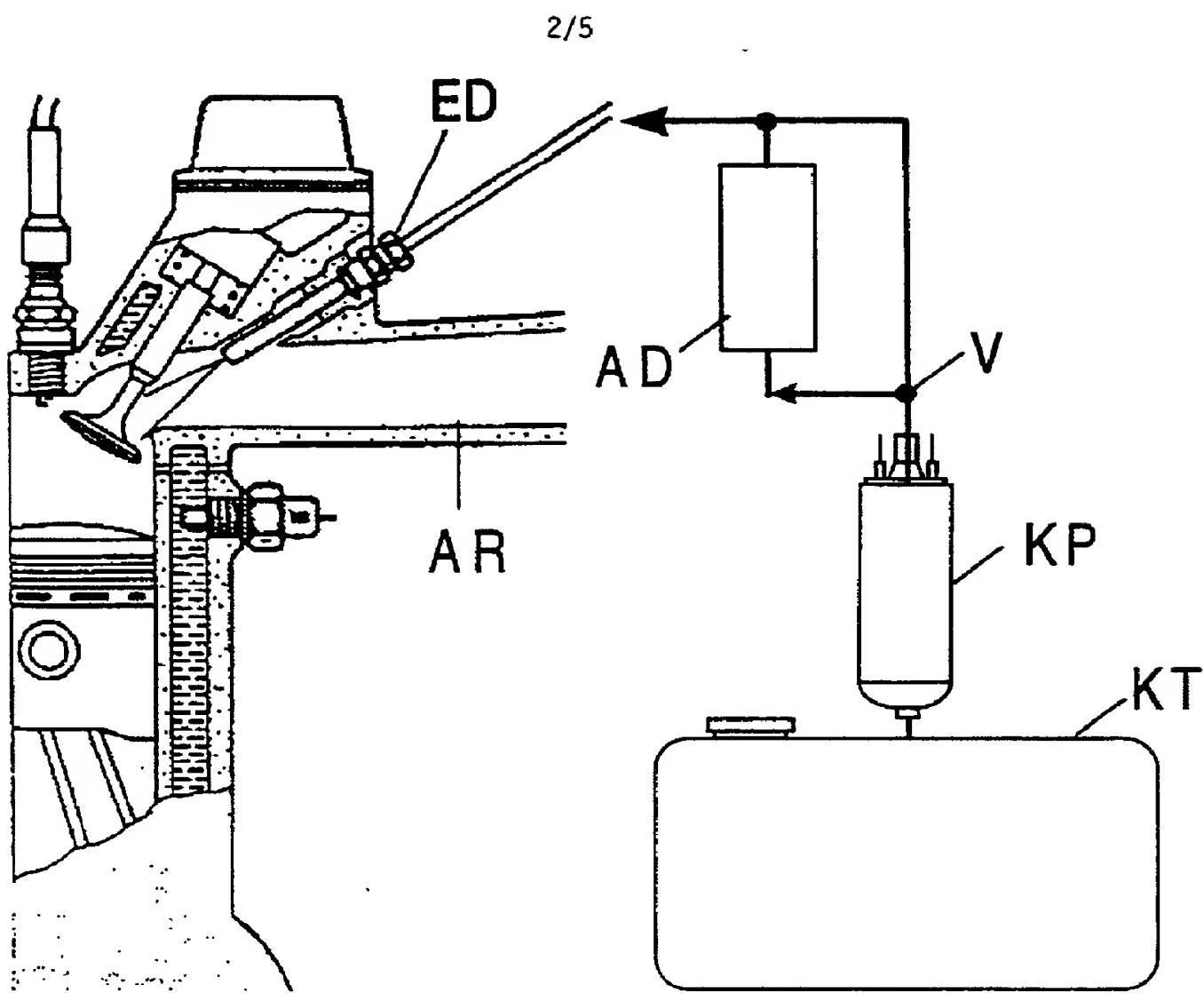


Fig. 2

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29301/WO/1

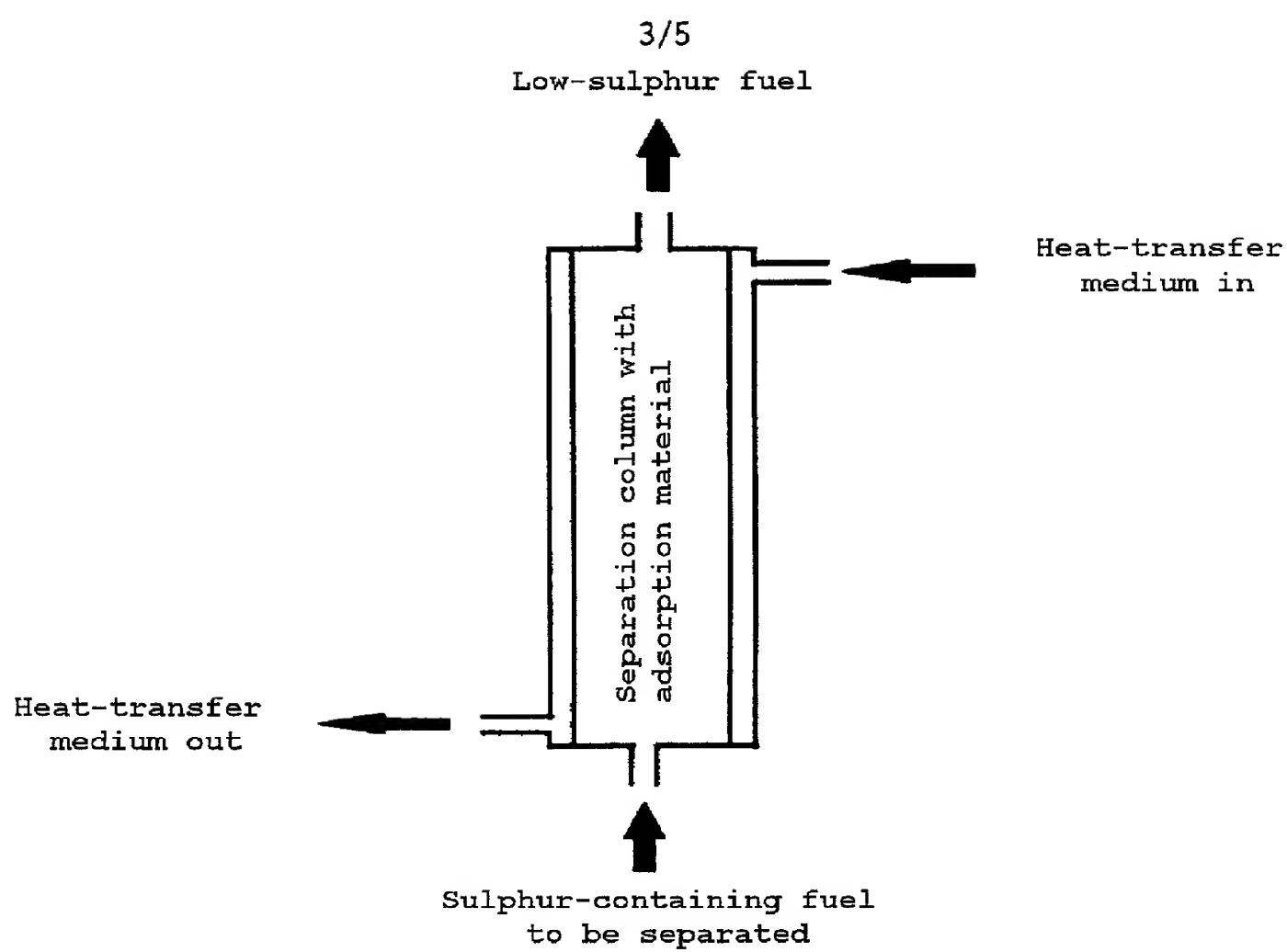


Fig. 3

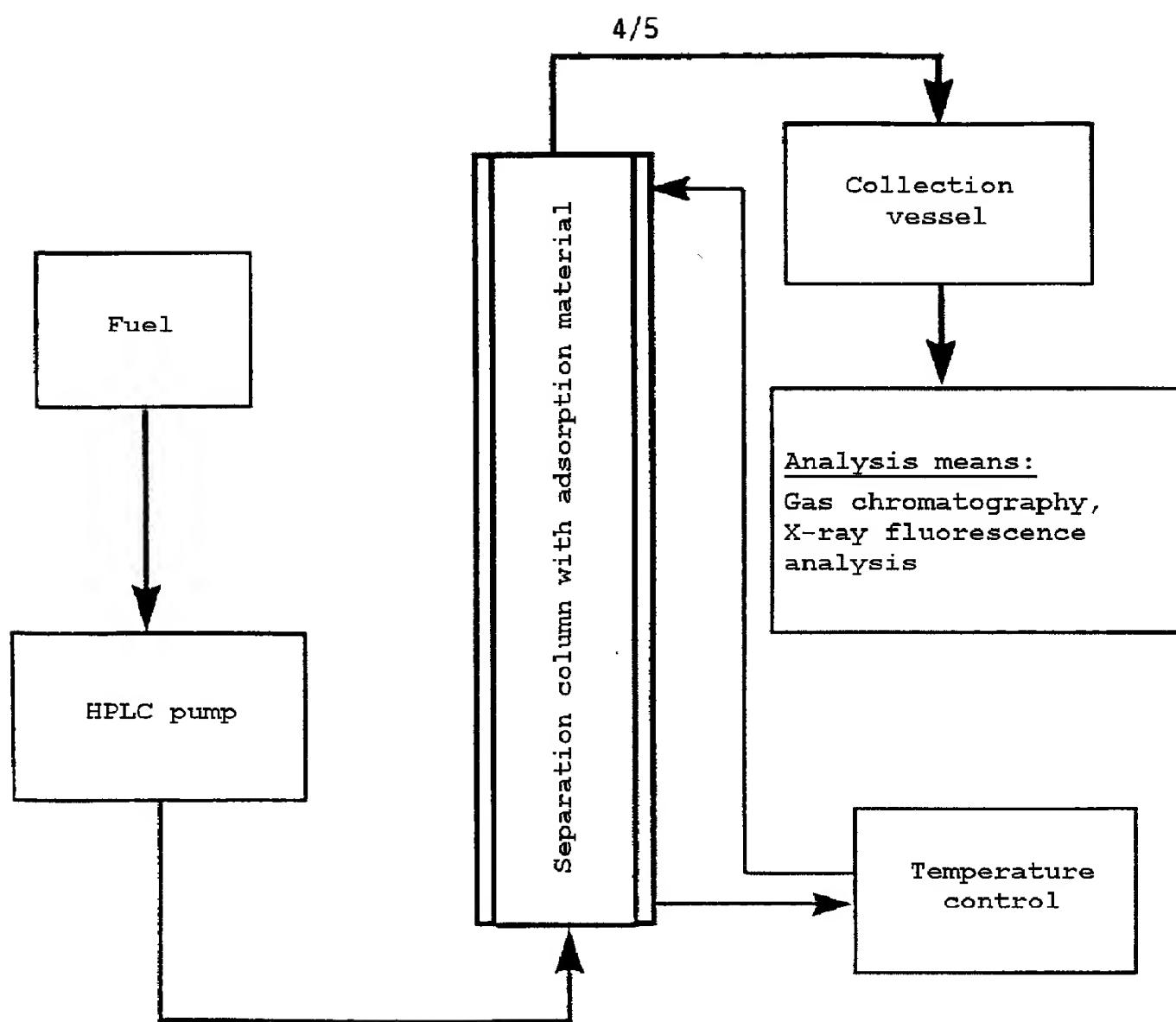


Fig. 4

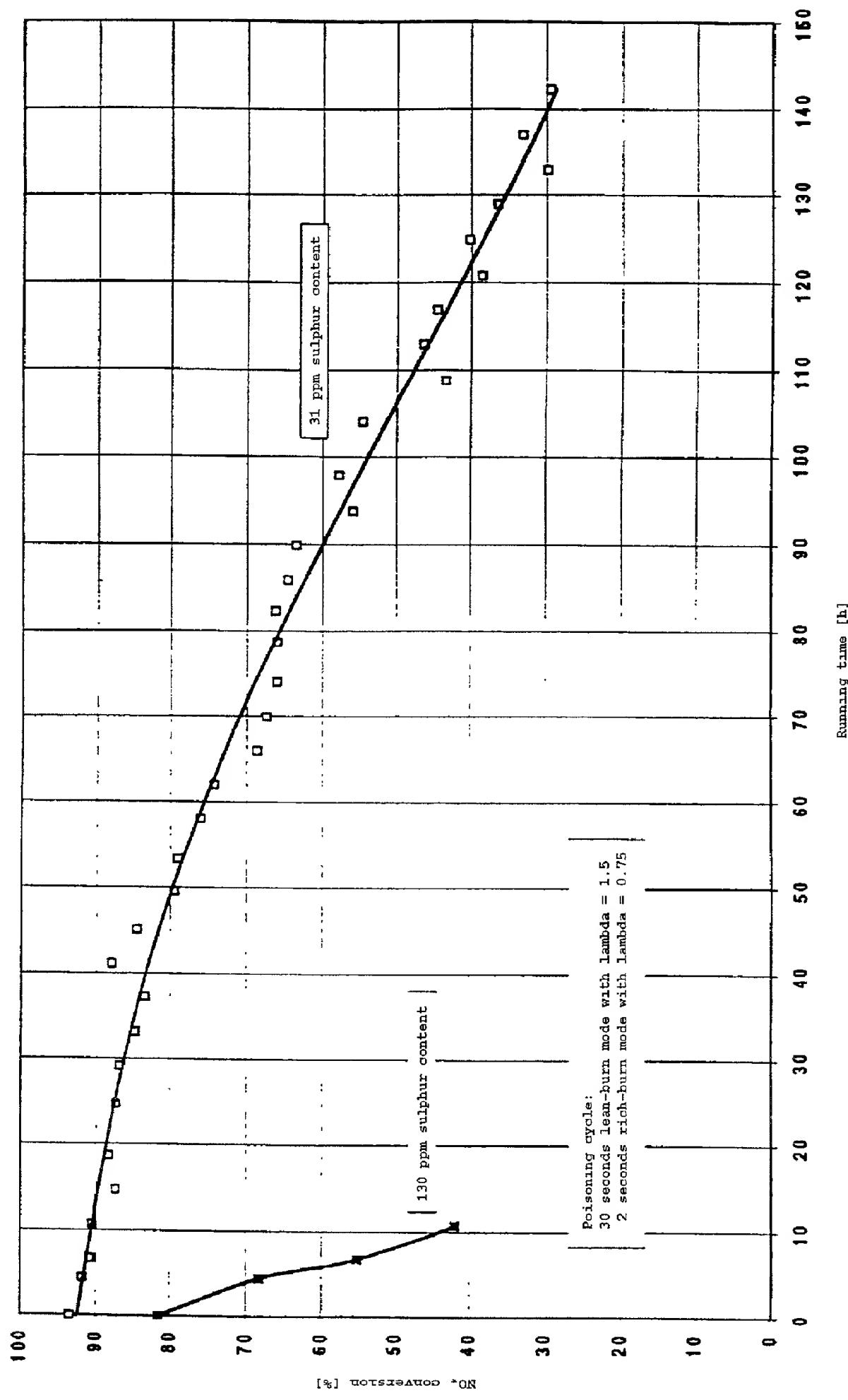


Fig. 5

DECLARATION AND POWER OF ATTORNEY - PATENT APPLICATION

As a below named inventor, I hereby declare that my citizenship, postal address and residence are as stated below; that I verily believe I am the original, first and sole inventor (if only one inventor is named below) or a joint inventor (if plural inventors are named below) of the invention entitled:

PROCESS FOR THE DESULPHURIZATION OF AN ENGINE FUEL ONBOARD A MOTOR VEHICLE

the specification of which

 is attached hereto, or
 was filed on October 1, 1999 as Application Serial No. PCT/EP99/07267
 and was amended on August 3, 2000 (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to be material to patentability as defined in 37 CFR §1.56. I hereby claim foreign priority benefits under Title 35, United States Code §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)	Priority Claimed		
<u>198 45 397.3</u>	<u>GERMANY</u>	<u>2 OCTOBER 1998</u>	<u>YES</u>
(Number)	(Country)	(Day/Month/Year)	

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose all information known to be material to patentability as defined in 37 CFR §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

<u>(Application Serial No.)</u>	<u>(Filing Date)</u>	<u>(Status)</u>
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I hereby appoint as principal attorneys Herbert I. Cantor, Reg. No. 24,392; James F. McKeown, Reg. No. 25,406; Donald D. Evenson, Reg. No. 26,160; Joseph D. Evans, Reg. No. 26,269; Gary R. Edwards, Reg. No. 31,824; and Jeffrey D. Sanok, Reg. No. 32,169, to prosecute and transact all business in the Patent and Trademark Office connected with this application and any related United States and international applications. Please direct all communications to:

Evenson, McKeown, Edwards & Lenahan, P.L.L.C.
1200 G Street, N.W., Suite 700
Washington, D.C. 20005
Telephone: (202) 628-8800
Facsimile: (202) 628-8844

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

INVENTOR:

Citizenship:

Post Office Address/

Residence:

Eberhard HOLDER

German

Albert-Schweitzer-Strasse 12

D-72127 Kusterdingen, GERMANY

(date)

(signature of 1st inventor)

DECLARATION AND POWER OF ATTORNEYAttorney Docket No. 225/49816

Page 2

INVENTOR:

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D-70619 Stuttgart, GERMANY

(date)

(signature of 2nd inventor)

INVENTOR:

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Post Office Address/
Residence: Im Zillhardt 14
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(date)

(signature of 3rd inventor)

INVENTOR:

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(date)

(signature of 4th inventor)

INVENTOR:

Citizenship: **Carsten PLOG**
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Residence: Döllenstrasse 13
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(date)

(signature of 5th inventor)

INVENTOR:

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Residence: Müllerstrasse 25
D-88045 Friedrichshafen, GERMANY

(date)

(signature of 6th inventor)

INVENTOR:

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Post Office Address/
Residence: Am Hohenstein 4
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(date)

(signature of 7th inventor)

DECLARATION AND POWER OF ATTORNEY

Attorney Docket No. 225/49816

Page 3

INVENTOR: Karl-Heinz THIEMANN
Citizenship: German
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Residence: D-71404 Korb, GERMANY

(date)

(signature of 8th inventor)

DECLARATION AND POWER OF ATTORNEY - PATENT APPLICATION

As a below named inventor, I hereby declare that my citizenship, postal address and residence are as stated below; that I verily believe I am the original, first and sole inventor (if only one inventor is named below) or a joint inventor (if plural inventors are named below) of the invention entitled:

PROCESS FOR THE DESULPHURIZATION OF AN ENGINE FUEL ONBOARD A MOTOR VEHICLE

the specification of which

 is attached hereto, or
 was filed on October 1, 1999 as Application Serial No. PCT/EP99/07267
 and was amended on August 3, 2000 (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to be material to patentability as defined in 37 CFR §1.56. I hereby claim foreign priority benefits under Title 35, United States Code §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed

<u> </u> 198 45 397.3	<u> </u> GERMANY	<u> </u> 2 OCTOBER 1998	<u> </u> YES
(Number)	(Country)	(Day/Month/Year)	

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose all information known to be material to patentability as defined in 37 CFR §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

<u> </u> (Application Serial No.)	<u> </u> (Filing Date)	<u> </u> (Status)
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I hereby appoint as principal attorneys Herbert I. Cantor, Reg. No. 24,392; James F. McKeown, Reg. No. 25,406; Donald D. Evenson, Reg. No. 26,160; Joseph D. Evans, Reg. No. 26,269; Gary R. Edwards, Reg. No. 31,824; and Jeffrey D. Sanok, Reg. No. 32,169, to prosecute and transact all business in the Patent and Trademark Office connected with this application and any related United States and international applications. Please direct all communications to:

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INVENTOR:

Citizenship:

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Residence:

Eberhard HOLDER

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25.4.2001

(date)


 (signature of 1st inventor)



23911

PATENT TRADEMARK OFFICE

DECLARATION AND POWER OF ATTORNEY

Page 2

Attorney Docket No. 225/49816

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4.05.01

(date)

Roland KEMMLER

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Roland Kemmler

(signature of 2nd inventor)

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27.04.01

(date)

Martin MATT

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25.4.01

(date)

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INVENTOR:

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17.05.01

(date)

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Döllenstrasse 13
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(signature of 5th inventor)

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INVENTOR:

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21.05.01

(date)

Thomas STENGEL

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70
INVENTOR:

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09.05.01

(date)

Ralph STETTER

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Am Hohenstein 4
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(signature of 7th inventor)

DECLARATION AND POWER OF ATTORNEY

Attorney Docket No. 225/49816

Page 3

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INVENTOR:

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Residence:

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DK

15.05.01

(date)

K.-H. Thiemann

(signature of 8th inventor)

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